(12) UK Patent Application (19) GB (11) 2 150 476 A

(43) Application published 3 Jul 1985

(21) Application No 8429445

(22) Date of filing 21 Nov 1984

(30) Priority data

(31) 8331922 (32) 30 Nov 1983 (33) GB

(51) INT CL⁴
B25B 28/00 F16B 39/00

(52) Domestic classification
B3N 3B

(56) Documents cited
GB 1577071
GB 1509054
GB 1162901

(58) Field of search
B3N

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(54) Inserting threaded inserts

(57) A power tool for inserting helically coiled inserts has a torque sensor for reversing the direction of rotation of the tool on sensing predetermined differences in torque and a mandrel for carrying an insert carried by the tool, the mandrel having a portion having a threaded surface for engaging with the insert, a protrusion on its end for engaging a drive tang of the insert and an adjustable depth stop contact of which with the workpiece causes one of said changes in torque to cause a change in the direction of rotation of the tool when an insert has been correctly positioned.

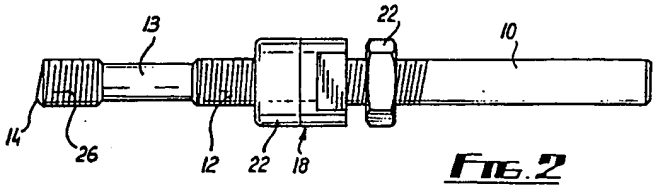

FIG. 2

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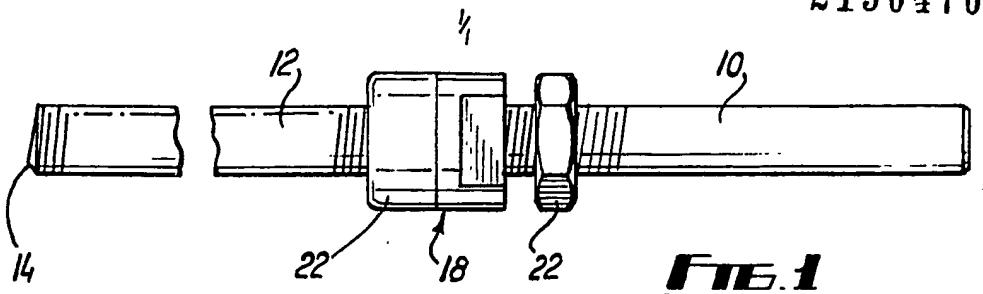

FIG. 1

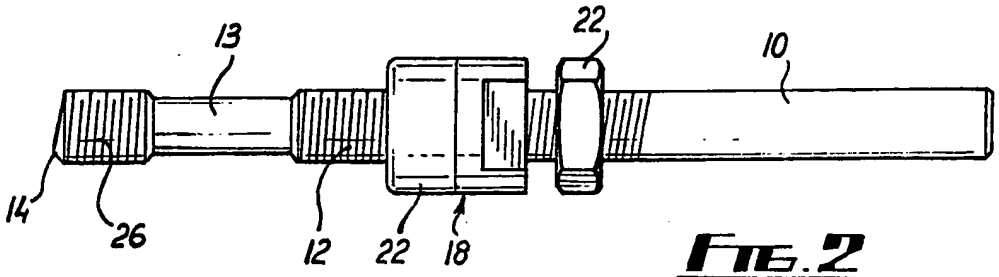

FIG. 2

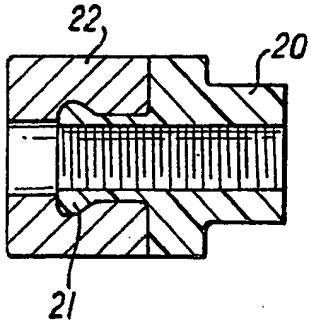

FIG. 3

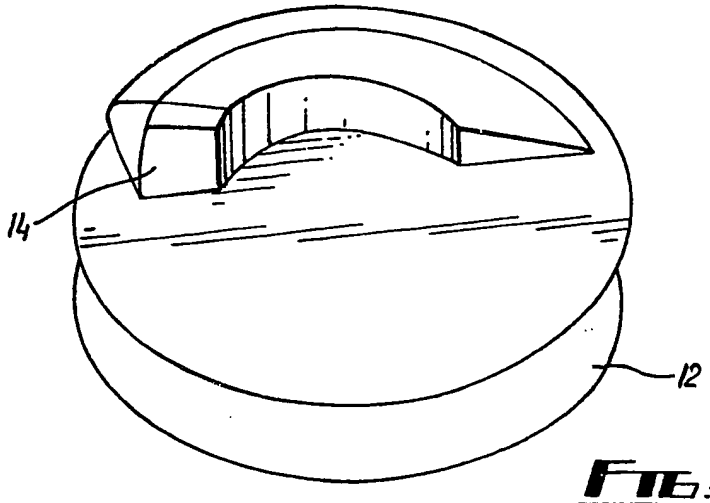

FIG. 4

SPECIFICATION

Improved insertion arrangement for wire thread inserts

The present invention concerns an improved method and means for inserting wire thread inserts into workpieces.

The invention is concerned especially but not exclusively with helically coiled wire thread inserts which are often used to provide a strong thread in a soft material. Inserts of this nature are inserted after the workpiece has been drilled and tapped with a tap having a predetermined oversized diameter. An appropriately sized insert is then fitted into the threaded hole such that the threaded passage defined by the insert corresponds in diameter, thread pitch etc. to the diameter and the pitch of the bolt or stud to be fitted.

It will be realised, therefore, that the insert is threaded into the hole. If this is done manually it is a time-consuming operation and usually involves rotating by hand a mandrel on which the insert has been mounted such that a tang directed radially inwards across the leading end of the insert abuts a stop formed on the lower end of the mandrel. When the insert has been fully inserted by the mandrel the direction of rotation of the mandrel is reversed so that it is removed leaving the insert installed in the workpiece.

Clearly this process can be speeded up by power driving the mandrel but difficulties arise in a power driving operation as the drive direction must be reversed when the insert is fully installed. Additionally, in certain instances, if the drive is not reversed at the correct time damage to the insert can result. To remove the mandrel after a power insertion it is necessary to reverse the direction of rotation of the power tool.

According to the present invention there is provided a power tool for positioning a wire thread insert comprising drive means, a mandrel rotatable by said drive means and adapted to support a threaded insert in such a way that the insert rotates in one direction with the drive means, a depth stop on said mandrel and torque sensing means operating in association with the drive means whereby on sensing a pre-determined increase in torque caused by the depth stop abutting the workpiece the direction of rotation of the drive means is automatically reversed to remove the mandrel from the now installed insert.

Further according to the present invention there is provided a mandrel for a power tool as described in the preceding paragraph, the mandrel having a first unthreaded portion adapted for fitment in the chuck of a power tool and a second support portion adapted to support an insert during a mounting operation, and threaded over at least part of its length, the end of said support portion having an abutment projecting therefrom adapted to co-operate with an inwardly directed tang on the insert and a depth stop mounted in a manner which enables adjustment of its position relative to said end of the mandrel.

Preferably a length of the support portion spaced from its end having the abutment is of reduced diameter and may also be unthreaded. The outside diameter of said reduced diameter portion may be equal to or marginally greater than the inside diameter of an insert.

Preferably the depth stop comprises a threaded collar threadably mounted on a threaded length of the mandrel and rotatably mounted on said threaded collar, a resilient workpiece contacting face.

Preferably said face is manufactured from nylon or a similar soft material. Preferably a lock nut is provided on the threaded portion of the mandrel carrying the depth stop to fix the depth stop in its adjusted position.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Figure 1 shows an elevation of a mandrel;

Figure 2 shows a similar view of a modified mandrel;

Figure 3 shows a depth stop of the mandrel of Fig. 1 or Fig. 2; and

Figure 4 shows a perspective view, on an enlarged scale, of one end of the mandrel of Fig. 1 or Fig. 2.

A power tool for automatically inserting helically coiled wire thread inserts comprises an electric motor mounted in a housing with the usual control means.

The tool includes a chuck into which a mandrel of the type shown in Fig. 1 may be inserted. In addition to the normal control means for the power tool there is provided a torque sensor which, on sensing an increase in torque above a predetermined value, causes the direction of the motor to reverse from a clockwise to a counter-clockwise direction and, on interrupting the supply cause the direction of rotation to return to clockwise.

The mandrel comprises an unthreaded shank portion 10 and a threaded insert carrying portion 12, the outside diameter and pitch etc. of the threaded portion 12 being similar after fitment to the internal configuration of the insert to be fitted to the workpiece. The insert at its end adapted, in use, to be innermost has a tang extending radially towards the centre of the insert and an abutment 14, best seen in Fig. 4, is provided on the free end of the mandrel to engage said tang.

A depth stop 18, carried on said threaded portion 12 comprises a first threaded collar 20, the internal diameter and thread pitch etc. of which corresponds to the threaded portion 12, and freely rotatably mounted on a bulbous extension 21 thereof a nylon or similar plastics material bush 22. A lock nut 24 is mounted on the mandrel on the side of the depth stop adjacent the unthreaded shank 10.

In operation, the depth stop is adjusted such that the face of the bush 22 adjacent the free end of the mandrel is located at a distance from said free end equal to the distance which the inner end of the insert has to occupy beneath the surface of the workpiece when it is in its operational position.

The lock nut 24 is screwed down onto the collar 20 to ensure that after positioning it does not move along the mandrel. The mandrel is then held in the chuck of the power tool which is set to rotate in a clockwise direction; an insert to be inserted is presented to the free end of the mandrel and, provided the insert is held against rotation, it is threaded onto the mandrel until its tang engages the abutment 14 on the end of the mandrel. The mandrel carrying the insert is presented to the predrilled and threaded hole in the workpiece and on continued clockwise rotation of the power tool the insert is threaded into the hole, this motion continuing until the leading face of the depth stop abuts the mouth of the hole. In this condition an increase in torque is experienced by the motor of the power tool and this is sensed by a torque sensor mounted therein and, when the torque sensed exceeds a predetermined value, the sensing means causes the rotation of the power tool to reverse. This causes the mandrel to screw itself out of the insert which now occupies its desired position in the workpiece. After the mandrel has cleared the installed insert the power supply to the tool is switched off and the tool returns to clockwise rotation when it is restarted for a subsequent insert to be fitted to the mandrel and the process to be repeated.

Various modifications can be made without departing from the scope of the invention. For example the depth stop can take any convenient form and, in certain instances, for example, where the mandrel is used for only one job, it need not be adjustable but may be permanently fixed.

The abutment provided on the leading end of the mandrel may be modified, for example to fit modified tangs on different inserts.

In the modified mandrel shown in Fig. 2 a part 13 of the length of the insert carrying portion 12 has a reduced diameter portion, of outside diameter just substantially equal to the inside diameter of the insert; thus only the witness of the thread or no thread is provided on this portion. In all other respects the mandrel is similar to that shown in Fig. 1 and similar reference numerals have been given to equivalent components and parts.

The mandrel of the modification function in a superior manner especially where the pitching of the coils of the insert is not equal to the desired pitch. With a tightly wound insert, i.e. an insert with reduced pitch, on inserting the mandrel, due to the tight coiling the insert's tang is pulled inwardly and contacts the abutment 14 before the mandrel reaches its final intended position in the insert, for example the coil adjacent the tang may not reach the first thread of the mandrel. By providing the reduced diameter portion, a length of the insert is capable of limited longitudinal displacement so that the engagement of the front or inner end of the insert with the front threaded portion 26 of the mandrel is over a sufficiently small axial length to overcome the problem. The insert, however, is still supported by the reduced diameter portion as its outside diameter is substantially equal to the inside diameter of the insert.

CLAIMS:

1. A power tool for positioning a wire thread insert comprising drive means, a mandrel rotatable by said drive means and adapted to support a threaded insert in such a way that the insert rotates in one direction with the drive means, a depth stop on said mandrel and torque sensing means operating in association with the drive means whereby on sensing a pre-determined increase in torque caused by the depth stop abutting the workpiece the direction of rotation of the drive means is automatically reversed to remove the mandrel from the now installed insert.

2. A mandrel for a power tool having a first unthreaded portion adapted for fitment in the chuck of a power tool and a second support portion adapted to support a wire thread insert during a mounting operation, and threaded over at least part of its length, the end of said support portion having an abutment projecting therefrom adapted to co-operate with an inwardly directed tang on the insert and a depth stop mounted in a manner which enables adjustment of its position relative to said end of the mandrel.

3. A mandrel as claimed in claim 2, in which a length of the support portion spaced from its end having the said abutment is of reduced diameter.

4. A mandrel as claimed in claim 3, in which said reduced diameter portion is unthreaded.

5. A mandrel as claimed in claim 3 or claim 4, in which the outside diameter of said reduced diameter portion is equal to or just marginally greater than the inside diameter of an insert.

6. A mandrel as claimed in any one of claims 2 to 5, in which the depth stop comprises a threaded collar threadably mounted on a threaded length of the portion of the mandrel and rotatably mounted on said threaded collar, a resilient workpiece contacting face.

7. A mandrel as claimed in claim 6, in which said face is manufactured from nylon or a similar plastics material.

8. A mandrel as claimed in claim 6 or claim 7, in which a lock nut is provided on the threaded portion of the mandrel carrying the depth stop to fix the depth stop in its adjusted position.

9. A mandrel as claimed in any one of claims 2 to 5, in which the depth stop comprises a collar slidably mounted on the mandrel and rotatably mounted on said collar a resilient workpiece contacting face.

10. A mandrel as claimed in claim 9, in which said face is manufactured from nylon or a similar plastics material.

11. A mandrel as claimed in claim 9 or 10, in which a grub screw is provided in the threaded collar to grip the mandrel to fix the depth stop in its adjusted position.

12. A power tool substantially as hereinbefore described with reference to Fig. 1 or Fig. 2, and Figs. 3 and 4 of the accompanying drawings.

13. A mandrel substantially as hereinbefore described with reference to Fig. 1 or Fig. 2, and Figs.

3 and 4 of the accompanying drawings.

14. Any novel subject matter or combination including novel subject matter herein disclosed, whether or not within the scope of or relating to the same invention as any of the preceding claims.

Printed in the UK for HMSO, D8818935, 5/85, 7102.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.